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Abstract

Krypton-85 in the Atmosphere

by

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According to measurements of several authors the atmospheric krypton-85 content increased by an order of magnitude since 1955. It has been stated previously**) that there is more krypton-85 in the atmosphere than one would expect from the estimated total energy release and the krypton-85 yield of all nuclear test explosions conducted so far. It seems probable therefore that atmospheric krypton-85 is primarily due to nuclear fuel treatment.

Since spring 1961 monthly krypton-85 samples have been collected in the Federal Republic of Germany***). These samples are taken directly from the oxygen-argon-xenon-outlet of an air liquefier. They are purified by fractional distillation. The xenon which is not removed from the samples is assayed by means of a mass-spectrometer, the krypton-85 activity is measured in a

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**) G. Delibrias and C. Jehanno, Bull. Inform. Sci.Techn., Paris, 30, 14 (1959);
O. Griesser und A. Sittkus, Z. Naturforschung 16a, 620 (1961).

***) D. Ehhalt et al., J. Geophys.Res. 68, 3817 (1963); and
D. Ehhalt Comptes Rendus du Colloque International sur la pollution radioactive des milieux gazeux, Saclay 13-16 Nov. 1963.

proportional counter. These closely spaced samples cover a period of strongly varying nuclear test activity.

Nevertheless, one finds a smooth increase in krypton-85 whose correlation with bomb testing is smaller than the experimental uncertainty. On the basis of the extremely high strontium-90 spring peak in 1963 it was possible to set an upper limit for the corresponding bomb contribution which should have shown up in the krypton-85 data if the bomb contribution were substantial. On the basis of available data on the Kr^{85}/Sr^{90} bomb yield and plausible assumptions on the worldwide dispersion of both nuclides, one would expect a flat hump of 5 - 10 % in the general krypton-85 increase which is indeed not outside the scatter of the measurements.

The krypton data presented therefore confirms strongly the suspicion that krypton-85 is primarily due to other sources, most probably to nuclear fuel treatment.